Effectiveness of movement and body awareness therapies in patients with fibromyalgia: a systematic review and meta-analysis

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ABSTRACT

INTRODUCTION: Fibromyalgia is a long-term condition that is associated with widespread pain and is recognized as one of the major common causes of disability. The standard clinical guidance for fibromyalgia includes both pharmacological and non-pharmacological interventions. In the latter, different interventions are implemented such as aerobic exercises, flexibility exercises, strength training, stretching and body awareness therapies. The aims of this review were to provide a summary of movement and Body Awareness Therapies in patients with fibromyalgia and to compare the different therapies in relation to outcomes.

EVIDENCE ACQUISITION: The search strategy was undertaken using the following databases from inception to October 2018: Pubmed, Cinahl, PEDro, PsychoInfo and The Cochrane Library. Articles were eligible if they were randomized controlled trials (RCTs) comparing movement and body awareness therapies with another intervention.

EVIDENCE SYNTHESIS: two authors independently extracted data and assessed trial quality. 418 studies were found, twenty-two of which met the inclusion criteria. Pain symptom was improved with movement and body awareness therapies such as, Affective Self-Awareness, T'ai Chi, Yoga, Belly dance, strengthening program and Resseguier method. Forest plot analysis in short term confirms positive trend in favor of body awareness; however a great heterogeneity was found between trials.

CONCLUSION: this systematic review and meta-analysis shows positive results in favour of movement and body awareness therapies as adjunct treatment to usual care in patients who suffer from fibromyalgia. Further work in identifying the mechanism of action by which body awareness therapies benefit outcomes should be undertaken.

Key words: Fibromyalgia, Movement, Awareness, Pain, Physical Therapy modalities.

TEXT

Introduction

Fibromyalgia is a long-term condition that is associated with widespread pain and is recognized as one of the major common causes of disability. Activities of daily life and movement quality are diminished in people suffering from fibromyalgia considering its several symptoms are not well controlled by existing treatments[1]. The prevalence of fibromyalgia in the world population is 2.7% [2], higher in women (4.2%) than in men (1.4%). The standard clinical management for fibromyalgia includes both pharmacological and non-pharmacological interventions. In the latter, different interventions are implemented such as aerobic exercises, flexibility exercises, strength training, stretching and body awareness therapies[3,4].

Human movement and function are key concepts in rehabilitation[5,6] and the study of human movement includes key phenomena. Movement awareness is a term that can be described as sensitivity to movement nuances, becoming aware of how the movements are performed and experienced in relation to space, time and energy, as well as, identifying movement reactions in relation to internal, environmental and relational conditions[7,8]. Examples of movement awareness therapies within physiotherapy include Basic Body Awareness Therapy and the Norwegian Psychomotor Physiotherapy[9,10]. Furthermore, body awareness therapies refer to a group of interventions sharing a common perspective that focuses on the internal subjective experience of the body[11]. Thus Body Awareness Therapies can be defined as body-oriented therapeutic approaches using an holistic perspective directed towards an awareness of how the body is used, in terms of body function, behavior and interaction with self and others[12,13]. This group of interventions promotes physical, mental and emotional well-being. While

the classification of body awareness therapies remains unclear since there are other approaches and traditions in the field, physiotherapy works to build a frame that give coherence and consistency for movements and body awareness approaches. Eastern approaches such as T'ai Chi, Qi Gong and Yoga are considered as meditative movement traditions which represent another category defined by some form of movement and body positioning, focusing on breathing and a cleared and calm state of mind with a goal of deep states of relaxation[14]. Movement and Body Awareness Therapies are applied in rehabilitation departments across Europe providing services that develop, maintain and restore people's maximum movement and functional ability. These departments help people at any stage of life, when movement and function are threatened by ageing, injury, diseases, disorders, conditions or environmental factors. Consequently, our article will consider movement traditions and body awareness therapies that have been previously practiced within structured rehabilitation programs using valid and reliable assessment tools. The most common assessment tool used is the Fibromyalgia Impact Questionnaire (FIQ), which is used to quantify the level of dysfunction caused in the patient by the symptoms of fibromyalgia during the last 7 days.

Body Awareness Therapies have shown positive outcomes in several pathologies such as cancer[15] in terms of physical, psychological and immune function[16], quality of life and bone density[17]. European movement approaches such as dance therapy, Feldenkrais and Alexander Technique[18] and integrative dance therapies such as biodance and aquatic biodance have shown efficacy in the rehabilitation programmes for fibromyalgia[19]. Although the effectiveness of body awareness therapies have been assessed by several authors[12,13,20] this updated systematic review and meta-analysis intends to provide a summary of Movement and Body Awareness Therapies in patients

suffering from fibromyalgia and to compare the different approaches in relation to clinical outcomes.

Evidence acquisition

The study involved a systematic review of randomized controlled trials according to PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)[21] criteria. Only randomized controlled trials examining movement and body awareness therapies on the treatment of fibromyalgia were included. The articles were included according to the following criteria: a) studies with participants with a diagnosis of fibromyalgia by the international classification of diseases with the code M79.0 such as rheumatism[22]; b) participants were treated with one movement or body awareness therapy approach compared with placebo, control intervention or standard care using a randomized controlled trial (RCT); c) English language.

Two independent reviewers searched in PubMed, CINAHL, The Cochrane Library, PEDro and PsycINFO from database inception to October 2018. The search terms used were “fibromyalgia” AND “body therapy” OR “body awareness” OR “body mind therapy” OR “body awareness therapy” OR “movement therapy” OR “movement quality” in the text. The filter “clinical trial” was also used (see search strategy in Table 1).

	Search terms	Items found
#1	Search **fibromyalgia**	10910
#2	Search **body awareness**	8001
#3	Search **body therapy**	454124
#4	Search **body mind therapy**	5394
#5	Search **movement therapy**	227666
#6	Search **movement quality**	30528
#7	Search **body awareness therapy**	3527
#8	Search **(#2 OR #3 OR #4 OR #5 OR #6 OR #7)**	669265
#9	Search **(#1 AND #8)** Filters: **Clinical Trial**	212

Table 1. Example of search strategy in PubMed

The reviewers screened the titles and abstracts of publications found in the databases and selected articles based on the eligibility criteria. Manual search was also performed through by cross-referencing with the studies selected in the previous search. In addition, to locate the unpublished research, we searched in websites.

The movement and body awareness therapy interventions had to include any of the following: t'ai chi, yoga, Qi Gong, the Rességuier method, Mindfulness-Based Cognitive Therapy, Basic Body Awareness Therapy, Norwegian Psychomotor Therapy or a combination of these, as well as any other similar body awareness therapy. In this review, standard care was defined as care that people would normally receive in the community, hospital or primary centre according to clinical guidance.

The initial electronic database search resulted in a total of 418 studies. Additional manual searches of reference lists and websites were also performed but did not provide any further articles. After the removal of duplicates, non-English language articles, non randomized clinical trials and movement therapy interventions, 396 articles were excluded and 22 were finally included in this review (see figure 1). The meta-analysis included 16 articles that analysed the FIQ scale as an outcome measure.

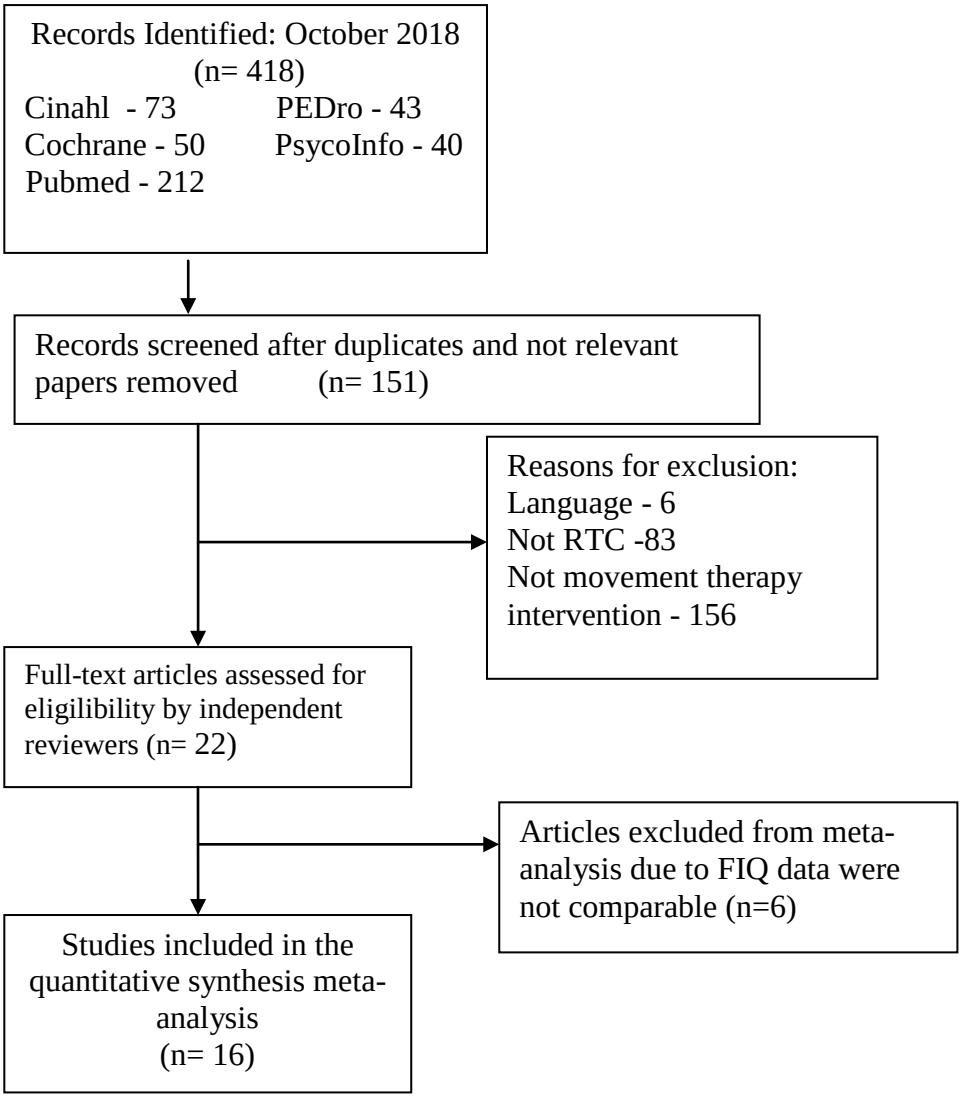

Figure 1. Flow chart of systematic review and meta-analysis inclusion and exclusion

After selecting the articles based on the eligibility criteria, the studies were assessed for risk of bias using Cochrane tools[23]. The following potential sources of bias were considered: sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, and selective reporting. Following Cochrane guidelines, each item was judged as “low risk”, “high risk” or “unclear risk” of bias.

The information from the included studies was presented descriptively (see table 2). The study outcomes were classified according to the following: a) physical aspects,

which include level of pain, pain threshold and number of tender points; b) psychological aspects, such as quality of life, self-efficacy, depression and anxiety; c) physiological aspects, such as fatigue and sleep quality.

Authors	Participants	Intervention group versus control	Duration and follow-up	Intensity and Frequency	Relevant outcomes (experimental versus control)	Results	Relevant instrument	Adverse effects
Astin et al. (2003) [24]	N=128 ♀ 127 ♂ 1 M=47.7	Mindfulness +Qi Gong group =64 Educational group=64	8 weeks Measurement baseline, 8, 14, 24 weeks	2,5 hours of training program (10-20 participants). First 90 minuts Mindfulness + 90 minuts Qi Gong once a week. An educational group once a week	Statistical improvements in intervention group FIQ p<0.001, TMS p=0.004, pain p<0.001 and depression P<0.001	Both groups showed statistical improvements in pain, FIQ, depression and total mialgia.	FIQ, TMS, SF- 36 pain score, 6 minute walk test, BDI	no
Baptista et al. (2012) [25]	N= 80♀ Age 18-65	Belly dance group=40 Control group= 40	16 weeks Measurement baseline, 16 and 32 weeks	1 hour twice a week (8 students). Classes consisted a warm-up exercise, movements, choreography and cool-down exercise	FIQ score showed significant differences between groups (p=0.003), VAS Scores and six minute walk test (p<0.001)	Significant improvements in pain 40%, quality of sleep, emotional aspects and mental health of SF-36.	VAS, 6 minute walk test, FIQ, SF-36, BDI, STAI, BDDE	no
Bravo et al. (2018) [26]	N= 41 ♀ 40 ♂ 1 M=51±10.75	Basic Body Awareness Therapy group=20 Control group=21	5 weeks Measurements pre-test post-test and follow-up 3 and 6 months	90 minuts twice a week. First two sessions were individual, the subsequent sessions included BBAT movements, dropsy massage and sharing reflections.	Significant improvements in pain (VAS) (p=0.037) and BARS-MQ (p=0.000)	Significant differences between groups in pain and movement quality. Anxiety improved in BBAT group over time.	VAS, BARS-MQ, BDI-II, STAI, HADS, SF-36	no

Authors	Participants	Intervention group versus control	Duration and follow-up	Intensity and Frequency	Relevant outcomes (experimental versus control)	Results	Relevant instrument	Adverse effects
Carbonell-Baeza et al. (2010) [19]	N= 59	Biodanza intervention group (n=27) Usual care group (n=32)	3 months	120 minutes once a week Consists in two parts: -Verbal phase 35-45 min theoretical information Vivencia phase 75-80 min : moving/ dancing	Significant differences in pain threshold of tender points the anterior cervical R and L and supraspinatus R and L, algometer score ($p = 0.008$), tender point count ($p = 0.002$), body fat percentage ($p = 0.001$), and FIQ total score ($p = 0.003$)	Significant differences between groups in pain, and symptoms of fibromyalgia	FIQ, SF-36, VPMI, HADS, GSES, RSES	no
Carson et al. (2010)[27]	N=53 ♀ M=53.7	Yoga group n= 25 Standard care wait-listed =28	8 weeks Measurements Pre-test and post-test	120 min once a week (7-12 patients) by a certified yoga teacher	FIQR showed significant differences F=15.28 p=0.0003	Improve FIQR symptoms, pain, fatigue, stiffness, poor, sleep, depression, poor memory, anxiety, tenderness, poor balance and environment sensitivity.	FIQR, PIGC, TMS, Timed Chair Rise, SCBT, CPAQ, CSQ, VMPCI	no

Authors	Participants	Intervention group versus control	Duration and follow-up	Intensity and Frequency	Relevant outcomes (experimental versus control)	Results	Relevant instrument	Adverse effects
Fontaine et al. (2010) [28]	N=92 88♀ 4♂ M= 47.7±10.7 years	Lifestyle physical activity (LPA) group Education control group	Twelve weeks	60 minutes group sessions, five to seven days each week increasing 5 minutes every week	LPA group reported significantly improvement in FIQ (P = .032) and less pain (P = .006).	Significant differences between groups in pain, and symptoms of fibromyalgia	VAS, FSS, CES-D, digital tender point, Body mass index, six-minute walk test	no
Horwitz, et al. (2006) [29]	N= 36	Dance / movement therapy treatment (n=20) Control group (n=16)	6 months 8 months follow-up	60 minutes once a week. The therapy focused in themes: a)awareness of the room, body and the group, b)movement expression c) movement/feeling, d)playing, drawing, verbalization e)differentiation of feelings	Positive significant correlation was found within the self-figure drawing between “amount of body details” and “proportion of paper used” baseline, 4 and 14 months (p=0.007, p=0.001, p=0.0001 respectively)	In the self-figure drawings, significant differences were seen in the variables “amount of body details” and “amount of paper use in percent”	Self-figure drawings CPRS, SOC, SSP, VAS, Global Assessment of well-being and pain, Ranking dance/music and drawing	no

Authors	Participants	Intervention group versus control	Duration and follow-up	Intensity and Frequency	Relevant outcomes (experimental versus control)	Results	Relevant instrument	Adverse effects
Hsu et al. (2010)[30]	N= 45 ♀ Age 25-66 M= 50.1	Affective Self-Awareness (ASA) intervention n = 24 Control group n= 21	6 months Measurements post-test and follow-up 6 months	One individual session 90-min three group sessions 2 hours/week.	BPI-pain and SF-36 (pain) showed significant differences at 6 months $p<0.001$	Improvements in both pain and physical function at 6 months. 45.8% of treatment participants had at least 30% pain reduction, and 20.8% had at least 50% pain reduction.	BPI, SF-36, MFI-20, Beliefs about Pain Control Questionnaire, Dolorimeter	no
Ismael Martins et al. (2014)[31]	N= 27 Age 28-67 M=42.5	Weekly Interdisciplinary program (WIP)	12 weeks	60 minutes once a week. WIP consists of educational activities, physical therapy, stretching, posture guidance, congnitive behavioral strategies	Significant differences were found in FIQ $p=0.03$, SF-12 physical and mental component $p=0.03$ and $p=0.001$	There was statistical difference between the groups in terms of efficacy post WIP intervention	FIQ, VAS, Post-Sleep Protocol PSI, SF 12, HAD	no
Jones et al. (2002)[32]	N=68 ♀ Age 20-60	strengthening program n= 28 group control: stretching program n=28	12 weeks Measurements Pre-test and post-test.	60 min twice a week. Both groups exercises performed in the standing, sitting and lying position and it were targeted the same 12 major muscles groups	No significant differences between groups were found. Within group analysis demonstrated strength training significantly improved pain, depression and anxiety.	Change scores indicated that on all measures that expect flexibility, the treatment group improved more than control group.	Cybex II isokinetic dynamometer, 2-prong spring loaded caliper,VAS, BDI, QOLS, ASES, FIQ	no

Authors	Participants	Intervention group versus control	Duration and follow-up	Intensity and Frequency	Relevant outcomes (experimental versus control)	Results	Relevant instrument	Adverse effects
Jones et al. (2012) [33]	N= 101 ♀ Age 20-70 M=55.7	8-form Yang-style Tai chi program n= 51 Education intervention n=50	12 weeks Measurements Pre-test and post-test.	90 min twice a week.	Tai chi group presented significantly differences in FIQ p=0.0002, BPI, ASES, TUG, Static and dynamic balance p<0.001	Pain, sleep disturbances decreased significantly in the t'ai chi group. Improved physical function and three functional mobility measures	BPI, ASES, PSQI, FIQ, TUG, body mass index	no
Kendall et al. (2000) [34]	N=20 ♀	Mensendieck system group Body awareness therapy	20 weeks Follow-up 3 and 6 months	MS 40 minutes once a week 18 individual sessions and 2 group sessions BAT 90 minutes once a week	In Mesendieck group FIQ score showed improvement (p=0.004) at 18 months followup.	The MS group had improved FIQ, ASES other symptoms, and pain at worst site at 18 months follow up The BAT group had improved global health at 18 months follow up, but lower results than the MS group.	VAS, FIQ, ASES, Coping Strategies Questionnaire CSQ, Quality of Life Scale QOLS	no
Liu et al (2012) [35]	N= 14 ♀ Age 20-70 M=55.7	Qi Gong group n=8 Control Group: Sham Qi Gong n=6	6 weeks Pre-test and post-test.	45-60 min once a week. The Qi Gong exercise were done in standing, sitting and supine body postures	The mean percentage changes in SFMPQ, MFI, PSQI and FIQ were -44.2%, -24.8%, -37.3%, -44.3% in Qi Gong group	Feasibility of a specific Qi Gong exercise format. Improve pain, fatigue, sleep quality, and functional limitation	SMPQ, MFI-20, PSQI, FIQ	no

Authors	Participants	Intervention group versus control	Duration and follow-up	Intensity and Frequency	Relevant outcomes (experimental versus control)	Results	Relevant instrument	Adverse effects
Lopez-Rodriguez et al. (2012) [36]	N=39	Aquatic Biodanza group n=19 Stretching group n=20	12 weeks	60 minutes Twice a week. The aquatic intervention consists: a)stretching and warm-up 10 min, b)biodanza movements 40 min c)stretching 10 min. The water was 29ºC	Intervention group showed FIQ score 52.16(16.18), VAS score 5.42 (2.19), BDI score 16 (7.39) and McGill score 28.68 (6.69) with $p<0.05$	There were significant differences between groups, in pain, fibromyalgia impact, and depression after the treatment.	FIQ, McGill-Melzack questionnaire, VAS, Pressure algometry, BDI	no
Lopez-Rodriguez et al. (2013) [37]	N= 59	Aquatic Biodanza group n=29 Stretching group n=30	12 weeks	60 minutes twice a week. The aquatic intervention consists: a)flexibility and breathing 10 min, b)biodanza movements 40 min c)stretching 10 min. The water was 29ºC	Significant differences between groups on PSQI 7.59(1.8), SAI score 38.79 (5.8), FIQ score 53.73(18), VAS score 5.17(2.1).	There were significant differences between groups in sleep quality, anxiety, pain and fibromyalgia impact.	PSQI, SAI, CESDS, VAS, Algometry and McGill-Melzack questionnaire, FIQ	no
Maddali Bongi et al. (2010) [38]	N=41 M= 45.5 38 ♀ 3♂ M= 51	Resseguier group n= 22 Control group n=19	2 months Pre-test and post-test and follow-up of 6 months.	60 min once a week. Resseguier method is based on the continuous attention to the patient to obtain patient awareness and control of perceptions.	Significant differences between groups at the end of treatment in FIQ score 34.1(17), SF-36 mental and physical index 47.31(9.74) and 44.48(8)	It improved pain, movement, sleep and relaxation, consumption of analgesics, with the achieved results maintained after a 6-month follow-up	SF- 36, FIQ, number rating scale 0–10 (NRS-0–10), number of drugs, RPS	no

Authors	Participants	Intervention group versus control	Duration and follow-up	Intensity and Frequency	Relevant outcomes (experimental versus control)	Results	Relevant instrument	Adverse effects
Maddali Bongi et al. (2012)[39]	N=30 M=57.3	Group 1: Resseguier Method (RM) and Qi Gong (QG) n= 15 Group 2: Qi Gong and Resseguier Method n=15	15 weeks Pre-test and post-test and follow-up of 12 weeks.	60 min RM and 45 min QG 7 weeks= 1xweek rest+ 7 weeks 2 x week with a total of 10 sessions	There were significant differences in FIQ score in group 1 44.72(16.67) and 2 44.4 (29.41) at 12 weeks and	RM and QG reduce pain, tenderness and disability and improve anxious symptoms. RM also ameliorates sleep quality and QG acts on depressive symptoms. There were no differences between groups at follow up	SF- 36, FIQ, number rating scale 0–10 (NRS-0–10), HADS, HAQ, RPS regional pain scale, TPE tender point evaluation	no
Mannerkorpi et al. (2004) [20]	N=36 ♀	Qi Gong + body awareness therapy (BAT) n=19 Control group n =17	3 months	1.5 hours once a week 8-10 patients comprising 14 sessions of BAT with breathing and postural techniques with Qi Gong	There were significant difference in BARS score 3.6(0.6) p = 0.03 at the end of treatment	Significant improvement in movement harmony for the treatment group	BARS, FIQ, Hand Grip test, Chair Test	Experienced exacerbation of symptoms while standing.
Parra-Delgado et al. (2013) [40]	N= 33♀ Age 30-70 M=52.6	Mindfulness-Based Cognitive Therapy (MBCT). n =15 Control group n =16	3 months Measurements Pre-test post-test and follow-up 3 months	2 hours and half 8 sessions in total. MBCT consists in formal practice at home, feedback on the practice at home and ended with the assignment of tasks and written summaries of each session	There were significant difference in BDI score 5.24 p=0.03	Comparison between groups: Reduces depressive symptoms and this decrease is maintained over time	MINI, BDI, FIQ, VAS	no

Authors	Participants	Intervention group versus control	Duration and follow-up	Intensity and Frequency	Relevant outcomes (experimental versus control)	Results	Relevant instrument	Adverse effects
Toussaint et al. (2012) [41]	N=44 M= 48 years (27-56) 91%♀	Amygdala retraining n =14* Control group n =7* *participants completed measures	One month	1.5 day multidisciplinary program and a 2.5-hour training course. It consists restore a more normal state of homeostasis through deconditioning the amygdale-mediated fear response.	There were significant differences in FIQ score 42(18.2), MYMOP-2 score 3.2(1), SF-36 physical and energy component 164.3(24.7), 44.3(16.2)	Amygdala showed significant improvements in scores for physical health, energy, pain, symptom distress, and fatigue	Short Form-36, MYMOP-2, MDFI, ESS, and FIQ.	no
Wang et al. (2010)[42]	N= 66 56♀ 10♂ M=50	Tai Chi group n=33 Control group wellness education and stretching program n=33	12 weeks Test at baseline, 12 weeks and 24 weeks follow up	60 min twice a week. In the first session will provide the theory, in subsequent sessions consisted 10 forms form Yang style. Each session included a warm-up and self-massage. Participants were instructed to practice tai chi at home for at least 20 minutes each day	There were significantly differences in FIQ score -27.8%, PSQI score was -2.9 points, SF-36 physical and mental component score 7.1 and 6.1 points.	Tai chi group showed significant improvements in impact of fibromyalgia, sleep disturbances and physical and mental components. Improvements with t'ai chi were maintained at 24 weeks.	FIQ, SF-36, VAS, PSQI, 6 minutes walking test, Patient's Global Assessment Score Physian's Global Assessment Score, Body mass index, CES-D, CPSS	no

Authors	Participants	Intervention group versus control	Duration and follow-up	Intensity and Frequency	Relevant outcomes (experimental versus control)	Results	Relevant instrument	Adverse effects
Wang et al. (2018) (43)	N= 226 209♀ 17♂ M= 51.78	Tai Chi group n=151 Control group aerobic exercise n=75	12 or 24 weeks Measurements pre-test post-test and follow-up 52 weeks	60 minutes once or twice a week. In the first session will provide exercise theory, in subsequent sessions included warm-up and a review of tai chi principles, meditative movement, breathing techniques and various relaxation methods. Aerobic exercise consisted an warm-up, choreographed aerobic training, cool-down and static stretching.	There was significant differences in FIQR mean score 5.5 (0.6-10.4) P=0.03at 24 weeks in groups combined. Also there were BDI mean score 4.3(0-8.5), HAD anxiety mean score 2.1(0.6-3.6) , coping strategies mean score 5.4(2.1-8.9)	At 24 weeks the tai chi groups improved significantly more than the aerobic exercise in FIQR scores. Also anxiety, depression, severity of symptoms and coping strategies were improved. Also twice a week tai chi improved more than once a week tai chi group	FIQR, VAS, HADS, ASES, PSQI, SF 36, CSQ, symptom severity scale, BDI-II, social support survey, IHAQ, CHAMPS, HAQ, chair stand, six minute walk, balance test.	no

Arthritis Self-Efficacy Questionnaire (ASES), Body Awareness Rating Scale-Movement Quality (BARS-MQ), Body Dysmorphic Disorder Examination (BDDE), Beck Depression Inventory (BDI), Brief Pain Inventory (BPI), Center for Epidemiologic Studies Depression (CES-D), Community Health Activities Model (CHAMPS), Chronic Pain Acceptance Questionnaire (CPAQ), Comprehensive Psychopathologic Rating Scale (CPRS), Chronic Pain Self-Efficacy Scale (CPSS), Coping Strategies Questionnaire (CSQ), Epworth Sleepiness Scale (ESS), Fibromyalgia Impact Questionnaire (FIQ), Revised Fibromyalgia Impact Questionnaire (FIQR),Fatigue Severity Scale (FSS), General Self-Efficacy Scale (GSES), Hospital Anxiety and Depression Scale (HADS), Health Assessment Questionnaire (HAQ), İmproved Health Assessment Questionnaire (IHAQ), M: mean age, Multidimensional Fatigue Inventory (MDFI), Mini International Neuropsychiatric Interview (MINI), Measure Yourself Medical Outcome Profile (MYMOP-2), Number Rating Scale (NRS), Multidimensional Fatigue Inventory (MFI-20), Patient Global Impression of Change (PGIC), Post-Sleep Protocol (PSI), Pittsburgh Sleep Quality Index (PSQI), Quality of Life Scale (QOLS), Regional Pain Scale (RPS), Rosenberg Self-Esteem Scale (RSES), State Anxiety Inventory (SAI), Sensory Integration for Balance Test (SCBT), Short Form 36 (SF-36), Short- FormMcGill Pain Questionnaire (SMPQ), Sense of Coherence (SOC), Swedish Universities Scale of Personality (SSP), State -Trait Anxiety Inventory (STAI), Total Myalgic Score (TMS), Tender Point Evaluation (TPE), 8-Foot Timed Get Up and Go (TUG), Visual Analogue Scale (VAS), Vanderbilt Multidimensional Pain Coping Inventory (VMPCI), Vanderbilt Pain Management Inventory (VPMI).

Table 2. Overview of included articles in systematic review

Evidence synthesis

After detailed evaluation of the twenty-two full texts, five studies were excluded from the meta-analysis for not reporting FIQ scale, Mannerkorpi[5] showed deviation standard as a result and Wang 2018 used FIQR and four different intervention arms. Regarding risk of bias, the main one was the performance bias due to the participants and personnel were no-blinded from knowledge of which intervention a participant received. Other important bias was outcome assessment, in most of them the studies don't describe in sufficient detail if the outcome assessors were blinded. Allocation concealment was another item that contributed to risk of bias due to the inherence nature of body awareness interventions. In two studies[38,41] the study design ensured to minimize bias of allocation concealment by comparing two body awareness interventions. In this way the participants could ignore the intervention received. The risks of bias according to the Cochrane tool are graphically reported in Figure 2.

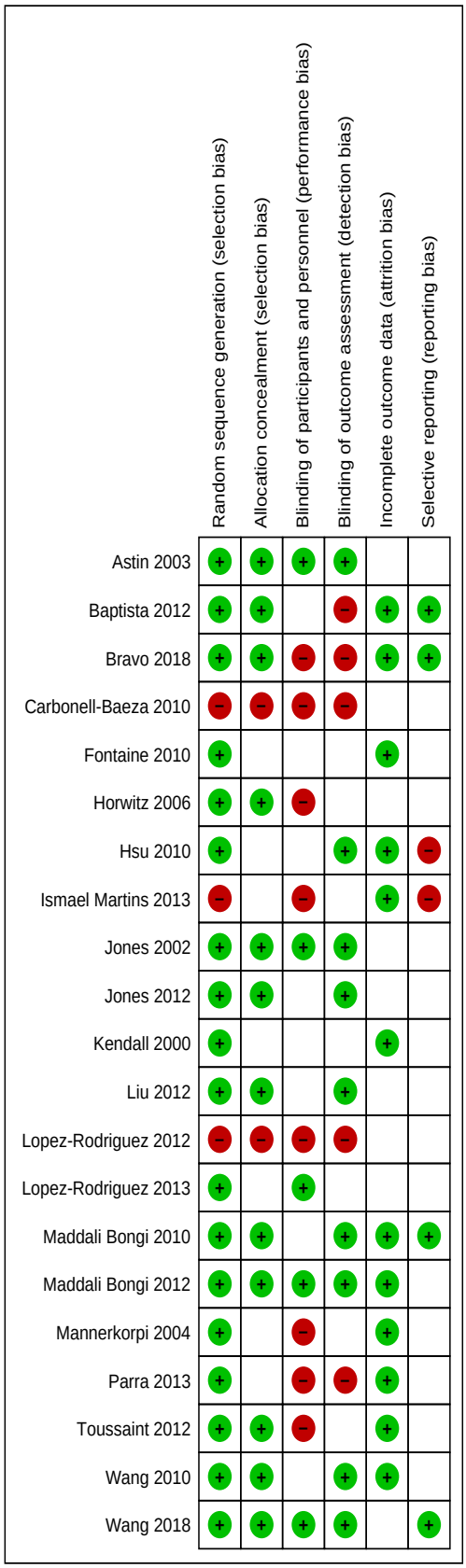

Figure 2. Risk of bias summary: review authors' judgements about each risk of bias item for each included study

Fibromyalgia Impact Questionnaire scores were used to estimate summary effects. Based on the time of follow-up and FIQ score evaluation, two different subgroups were defined, namely short term (FIQ score recorded at the end of intervention) (figure 3a) and medium term (FIQ score recorded between 12 and 32 weeks) (figure 3b). In short term, our analysis showed positive trend in favor of body awareness (BA), with a plot values of FIQ score 4 points larger than control group (WMD=-4.61 [95% CI: -5.30 to -3.92]; comparison: P= 0.00001; heterogeneity Chi^2 = 671.92, df = 16 (P <0.00001); I^2 = 98%. All of the studies that showed positive outcomes in favour of the control group compare the BA with other BA as Kendall[34] et al. and Jones[32]. Studies such as Ismael et al.[31] were excluded as to compare fibromyalgia with chronic pain. In our analysis, at the medium term (fig 3b), the mean difference increased between groups, with a plot values of FIQ score 18 points larger than control group (WMD=-15.85 [95% CI:-18.41 to -13.29]; comparison: P= 0.003; heterogeneity Chi^2 = 16.03, df = 4 (P <0.003); I^2 = 75%. Due to the small number of studies included in the medium term analysis a high degree of heterogeneity was detected. For the same reason, meta regression and evaluation of publication bias using the funnel plot were not performed.

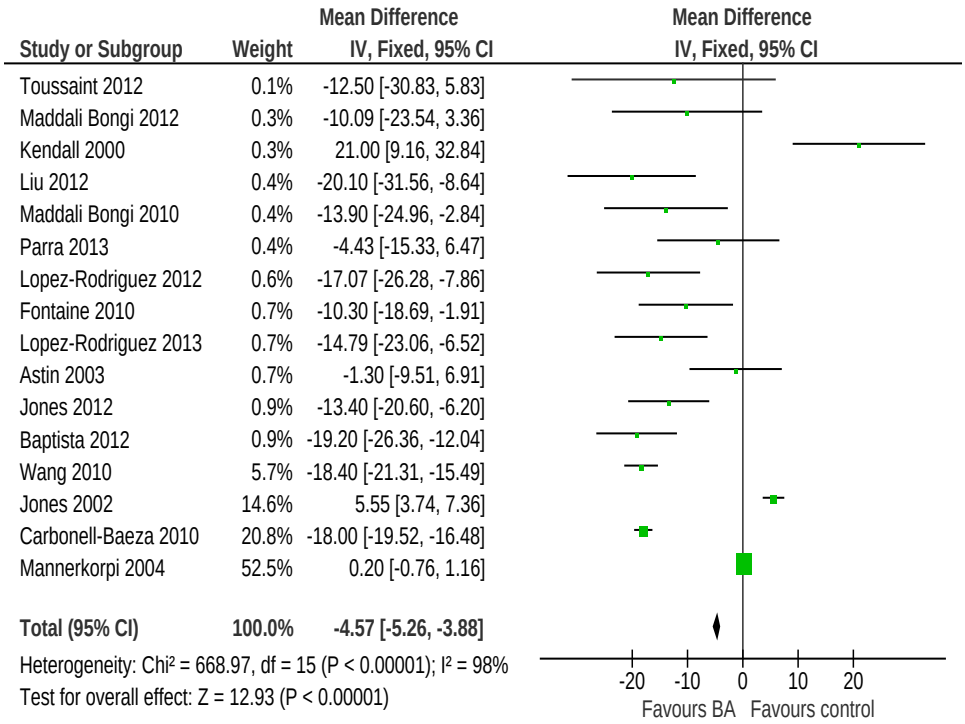

Figure 3a. Forest plot of comparison: 1 Body awarenes versus control short term (<12 weeks), outcome: 1.1 FIQ short term.

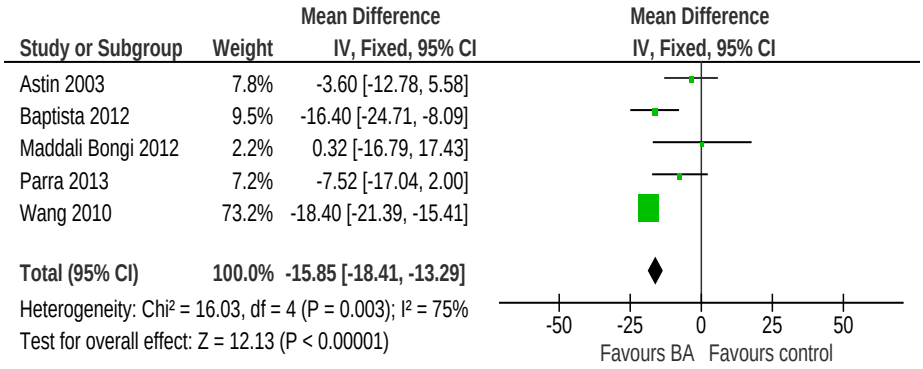

Figure 3b. Forest plot of comparison: 3 body awareness versus control mid term (>12 weeks and <32 weeks), outcome: 3.2 FIQ mid term.

The assessment tools used were Fibromyalgia Impact Questionnaire in 18 of 22 articles, Short-Form-36 in 10 articles, Visual Analogue Scale in 12 articles, Beck Depression Inventory in 6 articles and Arthritis Self-Efficacy Questionnaire in 4 articles. Fibromyalgia Impact Questionnaire is held as one of the most sensitive tools to

assess fibromyalgia course over the time and a key endpoint in clinical trials aimed at evaluating individual's responsiveness to different intervention models[43]. The range of possible total scores is 0 to 10 of 10 items for the measurement of physical function and severity of symptoms.

In total, 1294 patients who were suffering from fibromyalgia were included in the meta-analysis. The studies also included community-based participants. The age range of the participants was between 20 and 77 with an average of 51.1 years. According to the gender of participants, there were 1219 women, 45 men, and in 30 participants the gender was not specified as two studies did not define the gender of the participants[31,39]. In all studies fibromyalgia was diagnosed using the criteria of the American College of Rheumatology (ACR). The duration of the interventions was between 8 weeks to eight months. Further information on the characteristics of participants is provided in table 2.

The effect on physical symptoms

The outcomes related to physical symptoms of people suffering from fibromyalgia differ according to the therapy. Basic Body Awareness Therapy[26] showed significant improvement in levels of pain ($p= 0.037$) posttest. On Affective Self-Awareness (ASA)[30], 45.8% of treated participants showed at least 30% reduction in pain and the results were also maintained at six month follow-up. Moreover, Qi Gong[35] improved the general pain and functional limitation in the FIQ score ($p < .0125$) over 6 weeks. Liu et al. study compared two modalities of Qi Gong and both improved the general pain and functional limitation. In the other hand, another study[20] which combined Qi Gong and body awareness therapy only achieved improvement in

movement harmony, however this approach should be further analyzed due to the small number of subjects and the high drop-out rate.

The program of a specific eight-form Yang-style t'ai chi[33] also showed improvements in the level of pain, physical function, static and dynamic balance, and timed Get-up-and-Go, with the FIQ scores improving by 27.8% and the six minute walking test of 44.4 yd. Other studies showed that stretching, strengthening[32], amygdala retraining[41], body awareness therapy and Mesendieck[34] improves the symptoms of fibromyalgia as general pain, according to FIQ scores. Additionally, Rességuier method[38], Qi Gong[35,] yoga[27] and lifestyle physical activity[28], improve all symptoms such as general pain, movement quality, functional limitations and quality of life. Dance Therapy[29], biodance[19] and aquatic biodance[37] also led to improvement in pain and the best results were obtained after 32 weeks ($p < 0.022$).

The effect on psychological outcomes

The body awareness therapies showing effects on psychological outcomes are Mindfulness-Based Cognitive Therapy, Affective Self-Awareness (ASA), Qi Gong, t'ai chi, strengthening programmes, the Rességuier method and yoga. The most relevant assessment tools that have been used are FIQ, BDI, SMPQ, SF-36 and HADS. Mindfulness-Based Cognitive and mindfulness meditation plus Qi Gong[24] and Qi Gong plus Ressequier Method[39] improve depression symptoms. Moreover, T'ai Chi[42] showed that the mental component of SF-36 improved by 6.1 points and the grade of dysphoria improved 5.9 points, with both being maintained over 24 weeks. Strengthening[32] improves BDI, FIQ scores and quality of life. Other studies about the Rességuier method[38,39] and Aquatic biodance[37], where the variables of anxiety and depression were measured by the HADS scale and SF-36 items, showed improved anxiety and

depression symptoms. Yoga[27] reduced anxiety by 42.2%, depression by 41.5% and emotional distress by 30.1% over 8 weeks treatment. Basic Body Awareness Therapy showed significant improvement intragroup analysis regarding anxiety in HADS (p= 0.019) at 12 weeks and in STAI at 12 and 24 weeks

The effect on physiological outcomes

People diagnosed with fibromyalgia also suffer physiological symptoms such as sleep disturbances and fatigue. Affective Self-Awareness resulted in less fatigue post-treatment, although this was not observed at follow-up. T'ai chi[33] improved sleep quality with a score of 2.0 versus 0.3 in the control group. T'ai Chi[42] also showed an improvement of about 2.9 points in sleep quality. Qi Gong[35] shows 37.3% decrease in sleep disturbances and 24.8% reduction in fatigue, and FIQ impact improved by 44.3%. Following use of the Rességuier method[39], sleep quality was increased and it was maintained at follow-up. Yoga[27] showed beneficial reduction in fatigue of 29.9% and in poor sleep of 23.9%. Belly dancing[25] also showed significant improvements in the sleep quality item of the FIQ ($p < 0.006$).

Adverse events

Only Qi Gong plus body awareness therapy[20] reported exacerbation of symptoms while standing, and/or problems in concentrating. Adverse events were not reported in the other included studies (see table 2).

Discussion

This systematic review studied the efficacy of movement and body awareness therapies as an adjunct treatment for patients with fibromyalgia. Quality of evidence from 22 studies was analyzed according to the Cochrane Collaboration tool. In assessing the risk of bias only 2 studies[19,36] can be considered as displaying a high risk of bias. The rest of the studies were classified as unclear or low risk of bias. The bias of blinding participants was considered difficult to follow especially when delivering the body awareness intervention. The studies of Kendall[34] and Maddali-Bongi[39] compared two different body awareness interventions, in this way the patients could be blinded about the aim of research intervention.

Only four types of body awareness therapies were analysed by more than one study: Qi Gong, the Rességuier method, dance therapies and t'ai chi. Our review, with some limitations, does indicate that the body awareness therapies improve the symptoms of fibromyalgia: the physical symptoms are improved by Mindfulness-Based Cognitive Therapy, Affective Self-Awareness, strengthening, stretching programmes, t'ai chi, Qi Gong, yoga, the Rességuier method and amygdala retraining, Mesendieck system, Body Awareness Therapy, Basic Body Awareness Therapy, educational physical activity and dance interventions.

Despite the heterogeneity of articles in the meta-analysis, the short-term effect showed potential benefits towards body awareness interventions versus control groups. A potential reason for this variety of findings in the short term was the clinical heterogeneity or the influence of different subtypes of body awareness interventions. In general, the weight of articles was low due to the wide mean standard of the results. And the magnitude of treatment effects of body awareness therapies varied in relation to

the participants. For these reasons, the features of body awareness intervention has to be researched in proof to determinate the cause of these variations. Studies within the included reviews here were small (often fewer than 60 participants in total). Small studies are known to overestimate the treatment effect by up to 32% in comparison with bigger studies[39].

A growing body of articles studied the common properties of body awareness[11,44]. Although the theoretical model of most of the body awareness therapies is still not defined, there are some plausible explanations for the observed benefits. All body awareness therapies involve the whole person including all movement characteristics – physical, psychological, physiological and existential perspectives – and focus on breathing, postural balance and awareness[45]. The therapies that achieved positive outcomes are centred around individual resources as balance, breathing and awareness. With this regard, Basic Body Awareness Therapy[26] and the Rességuier method[38] are based on continuous attention given to the patient during the whole session. Furthermore, we suggest that the activation of deep postural muscles[46] during the body awareness treatment follows changes in biomechanical[47], physiological[48] and emotional function[49].

We found a general agreement that emotional response in humans involves three interrelated systems of processes: neurophysiological (autonomic nervous system and neuroendocrine activation), motor or behavioural-expressive processes and cognitive system. Emotions are composite states involving all three processes[50]. Moreover, presence is essential to having contact with emotions[51]. According to Damasio[52], emotions are generated by conveying the current state of the body to the brain through interoceptive and propioceptive afferent input. The resulting brain activation patterns represent unconscious emotions and correlate with conscious feelings. This proposition

implies that through deliberate control of motor behavior and its consequent propioception and interoception, one could regulate his emotions and affects his feelings. Because of new movement experiences, new feelings and psychological changes can appear, new ways of thinking can be present, and new existential aspects can arise. In this regard, the concept of central sensitization of nociception had been pointed as the main cause of widespread chronic pain. Central sensitization is characterized clinically by hypersensitivity to mechanical stimuli, and neurophysiologically by significant increases in the membrane excitability and synaptic efficiency of spinal neurons involved in nociception. We may make reference that body awareness interventions activate different endogenous systems in physiological functions as immune system, autonomic, endocrine and their interaction[46]. That kind of interventions affect neuroinflammation presence in chronic pain[52]. Further, researches using biomarkers to analyze the changes in endogenous systems in body awareness therapies would be suggested. In addition, since research is still limited, further studies should focus on other movement awareness therapies that might also be used among people suffering from fibromyalgia such as Basic Body Awareness Therapy.

The adverse effect of symptom exacerbation in body awareness therapy should, due to the small sample size and high dropout rate in existing studies, be further explored. Some explanations of this could be the increase of symptoms awareness[8,44,53], the learning stimulated self-observation which could have increased the perception of pain.

Due to the increasing interest of movement and body awareness therapies and their effect on fibromyalgia, various previous systematic reviews have been conducted. In 2013, Courtois[4] conducted a review focused on body awareness interventions including RCTs published until 2012 and only searched for a limited group of therapies

such as massage, hypnosis and autogenic training. This could have left out some eligible interventions. Our review could be a good update of the state of the art as we cover more recent studies until October 2018, and we included a larger group of therapies. The conclusions of Courtois review are with our study consistent showing that body awareness therapies improve the symptoms of fibromyalgia, but it is difficult to predict positive outcomes, especially for Fibromyalgia Impact Questionnaire and pain, due to limitations to their implementation in clinical practice. Another review was published by Cadenas-Sanchez and Ruiz-Ruiz[53], which analysed the interventions focusing on physical activity. In this review some of our articles were included, however, since the focus was different more towards general exercise and physical activity, some articles focusing on movement and body awareness interventions were not included by Cadenas-Sanchez and Ruiz-Ruiz.

Limitations

As with any meta-analysis, there is a potential for selection bias. First, screening references of identified trials may bring positive results because trials with positive results are more likely to be published than trials with negative outcomes. Second, high proportion of the included studies were not blind, additionally the researchers may not always be able to be blind to the participants in the intervention. Third, most of the selected research compares the experimental intervention with a control/comparison group, using the standard care which could differ among studies. Another limitation could be the level of education or clinical experience of the therapists who ran the body awareness therapy interventions. Another limitation is that all studies included follow-up in the short or medium term, so the long-term effect of body awareness therapies remains unclear.

Finally, regarding FIQ as an instrument clinically relevant that measures the effect of problems experienced by patients with fibromyalgia, it indicates that only the 14% change in the FIQ total score was clinically relevant for patients suffering from fibromyalgia[54].

Clinical implications

Twenty-two studies of body awareness therapies obtained positive results in the treatment of fibromyalgia. Body awareness therapies are cheaper intervention than pharmacological interventions as it is shown in other fields as psychiatry[9], and simple to implement in clinical settings and no clear adverse effects have been reported. We suggest that these therapies could be implemented within health system rehabilitation programs and costing verified through an economic evaluation study. While body awareness therapies appear to be a promising intervention for fibromyalgia symptoms, many questions remain unanswered. We need to clarify whether the benefits are maintained in the long term and which body awareness therapies and what dosage, are most effective.

Future research

Due to the positive preliminary results regarding the effects of movement and body awareness intervention as a professional treatment for persons suffering from fibromyalgia, future research may be focused on analysing the long-term effects and a deeper analysis of each body awareness therapy approach in terms of physiological mechanisms as well as exploring other therapies which might also have positive effects to these patients. Further studies using biomarkers to analyze the changes in endogenous systems in body awareness therapies would be necessary. Economic evaluations are

also suggested to support the inclusion of these pilot interventions in the healthcare services.

Conclusion

This systematic review demonstrates the effectiveness of movement and body awareness therapies approaches as an adjunct treatment to usual care in people suffering from fibromyalgia. The therapies that may improve a wide range of symptoms are t'ai chi, Qi Gong, yoga, Basic Body Awareness Therapy, Affective Self-Awareness and the Rességuier method. The beneficial outcomes for fibromyalgia are achieved in relation to pain, pain threshold, number of tender points, sleep quality, fatigue, anxiety, depression and quality of life. Future research on other movement and body awareness therapies and on long-term outcomes may contribute to currently available evidence.

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Clinical messages

- Movement and Body Awareness Therapies may be an effective intervention for people suffering from fibromyalgia.

- Movement and Body Awareness Therapies may improve pain, psychological conditions and physiological symptoms in people suffering from fibromyalgia.

- Movement and Body Awareness Therapies may be included in the multidisciplinary intervention for people suffering from fibromyalgia.

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